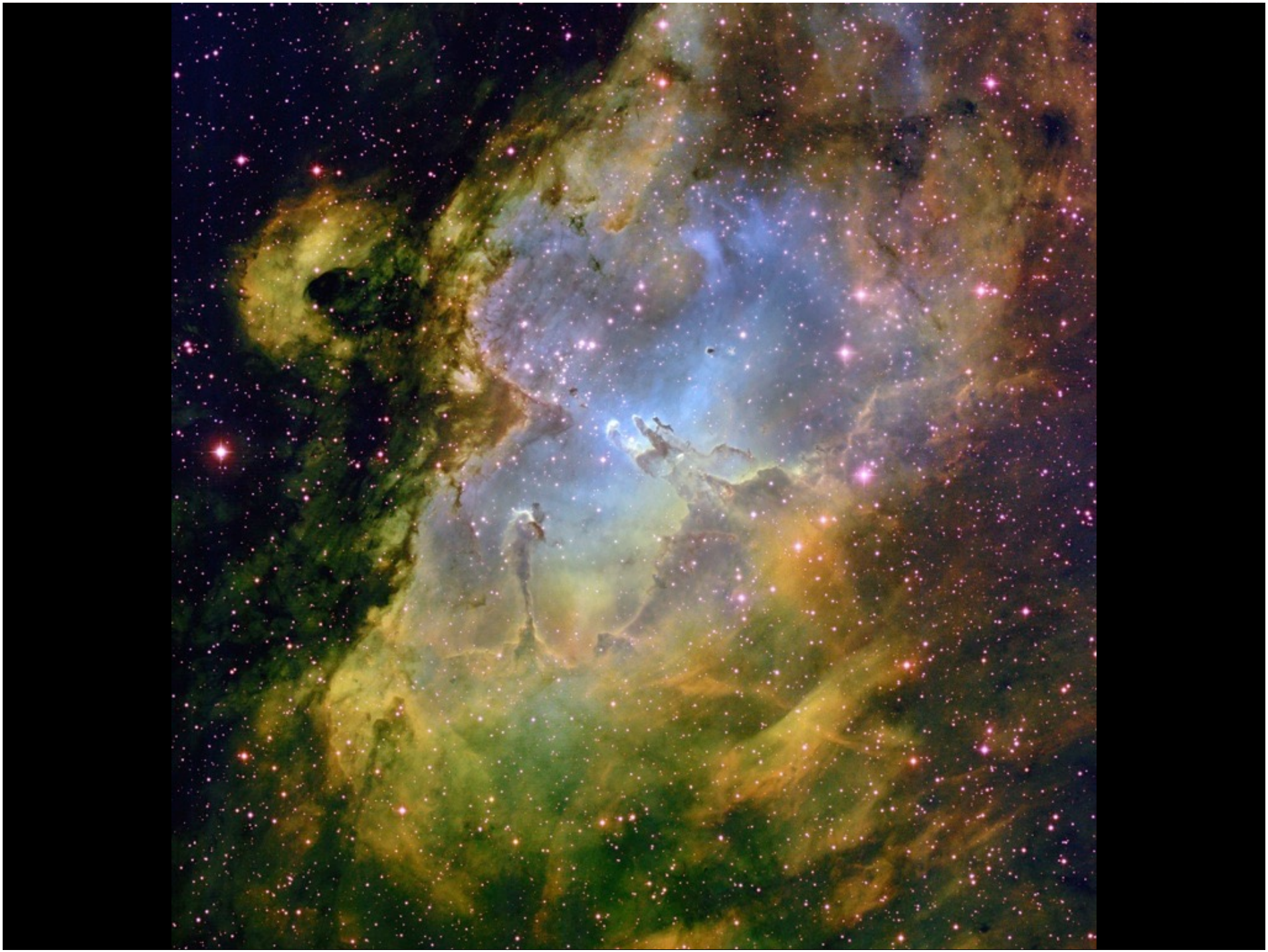
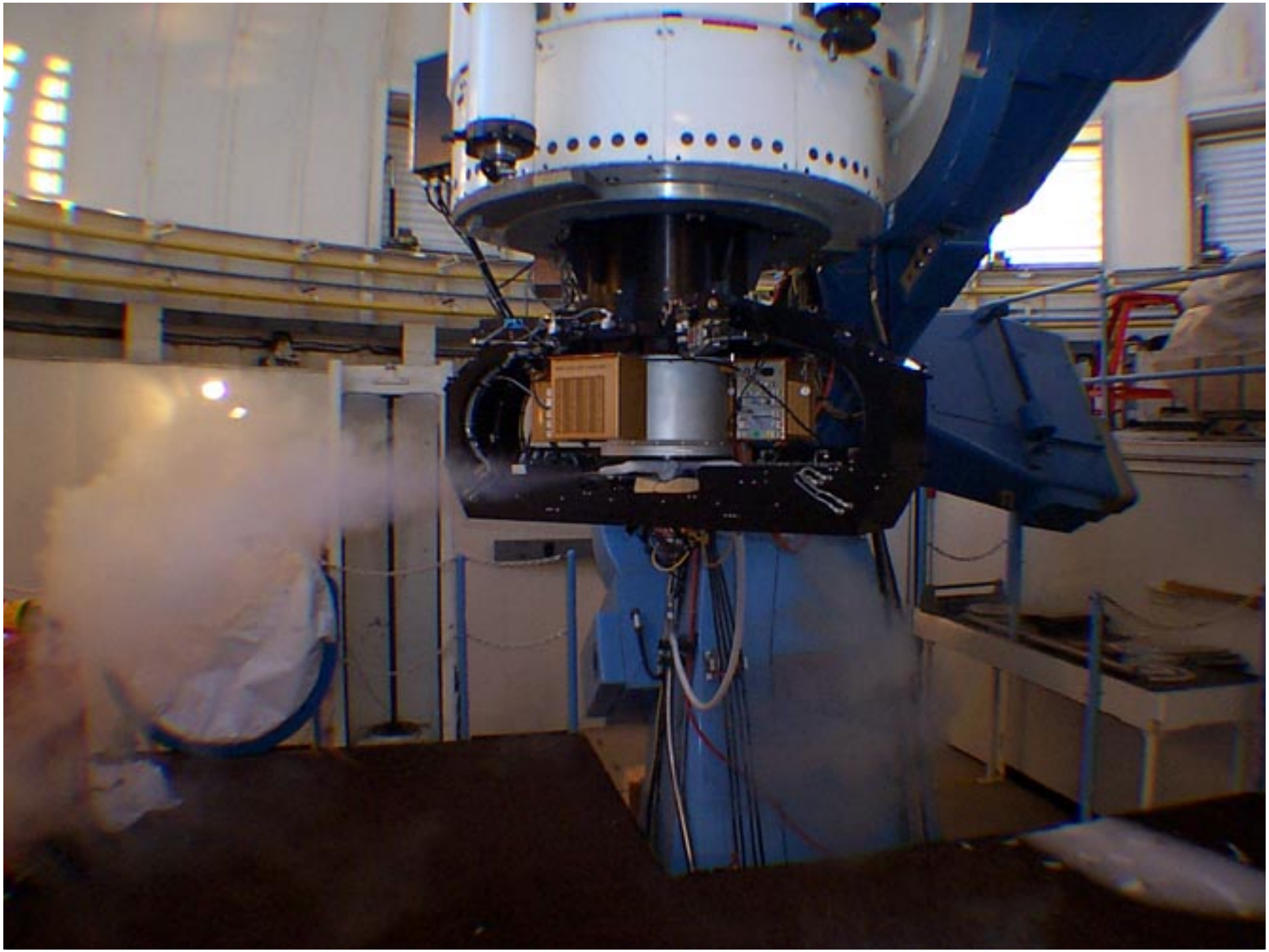
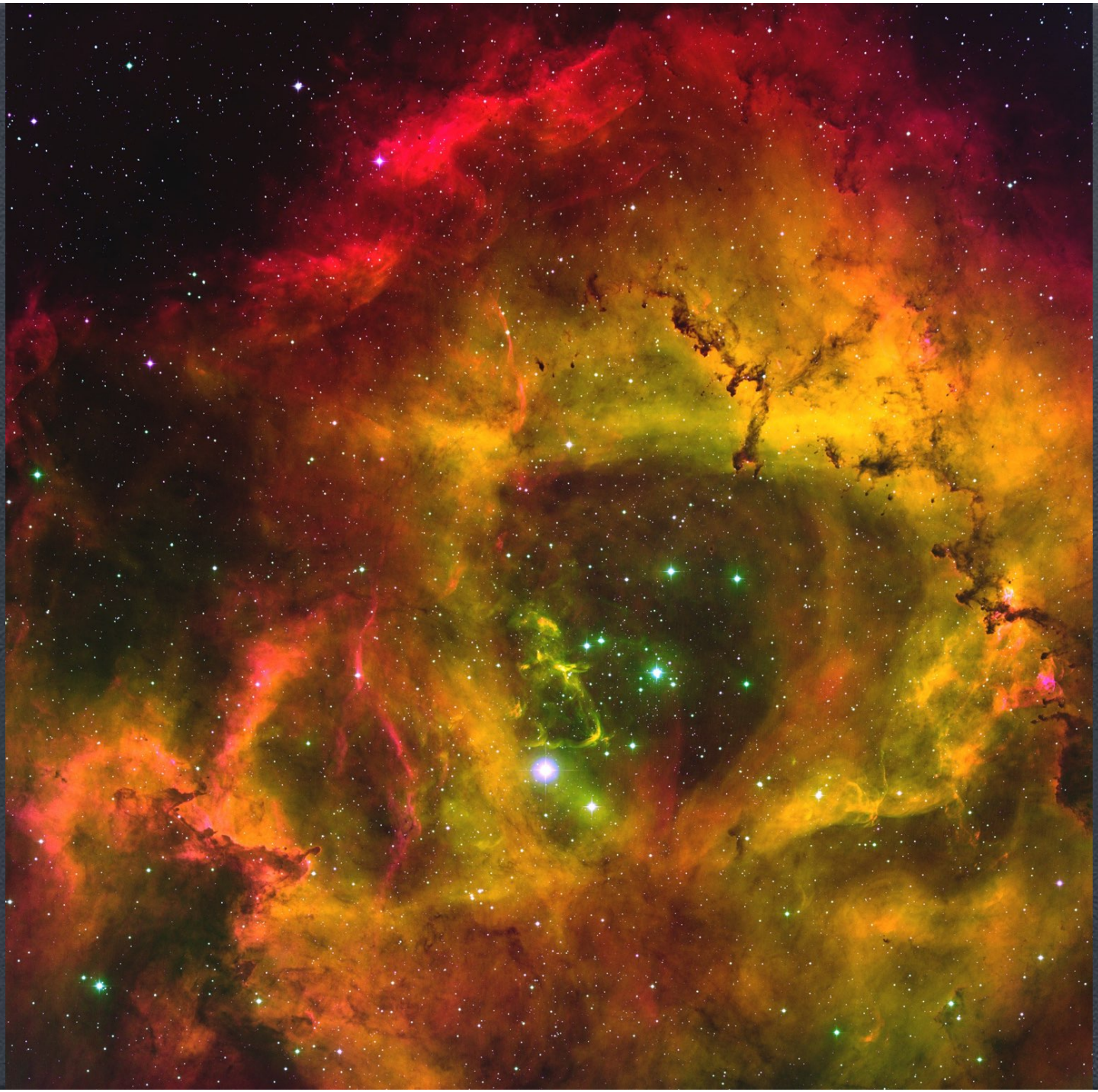
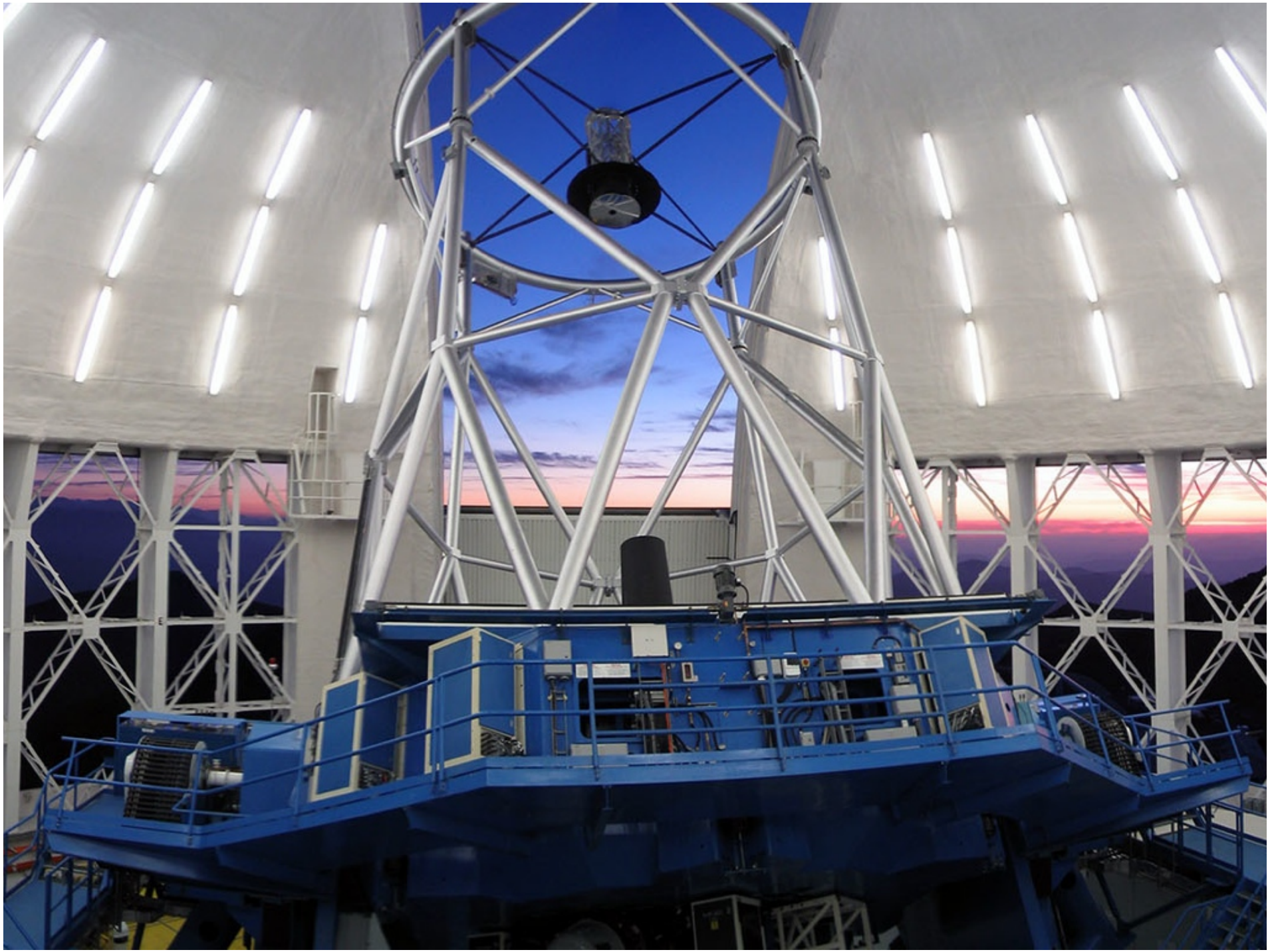
Coloring the Universe

Dr. Travis A. Rector
University of Alaska Anchorage





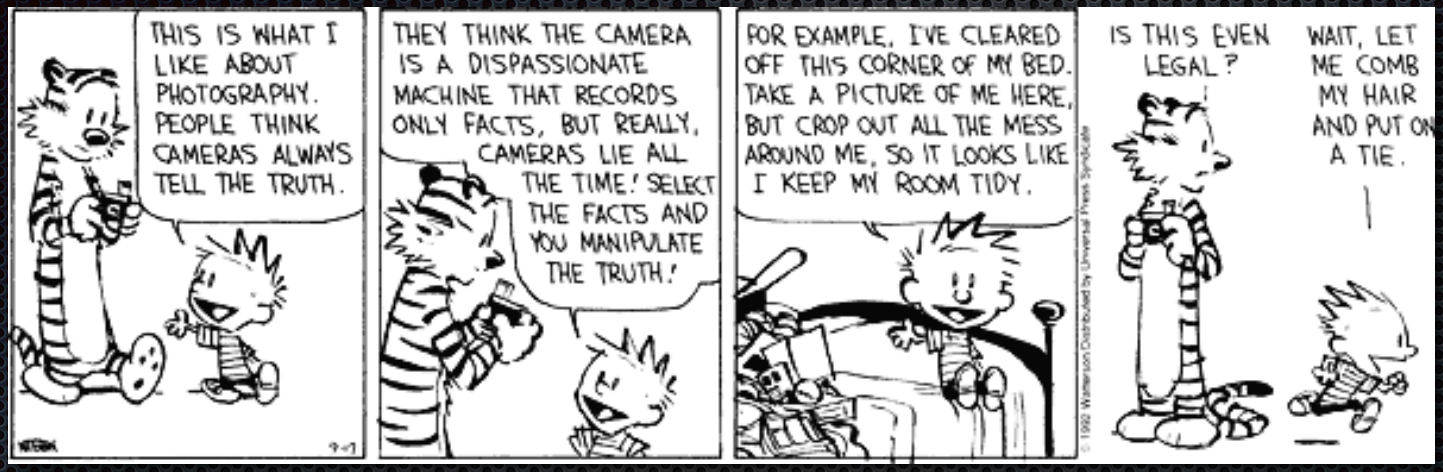




Why do we make images?

- Visualize scientific results
- Demonstrate new tech
- Share the Universe!

The Camera as a Record of Reality...

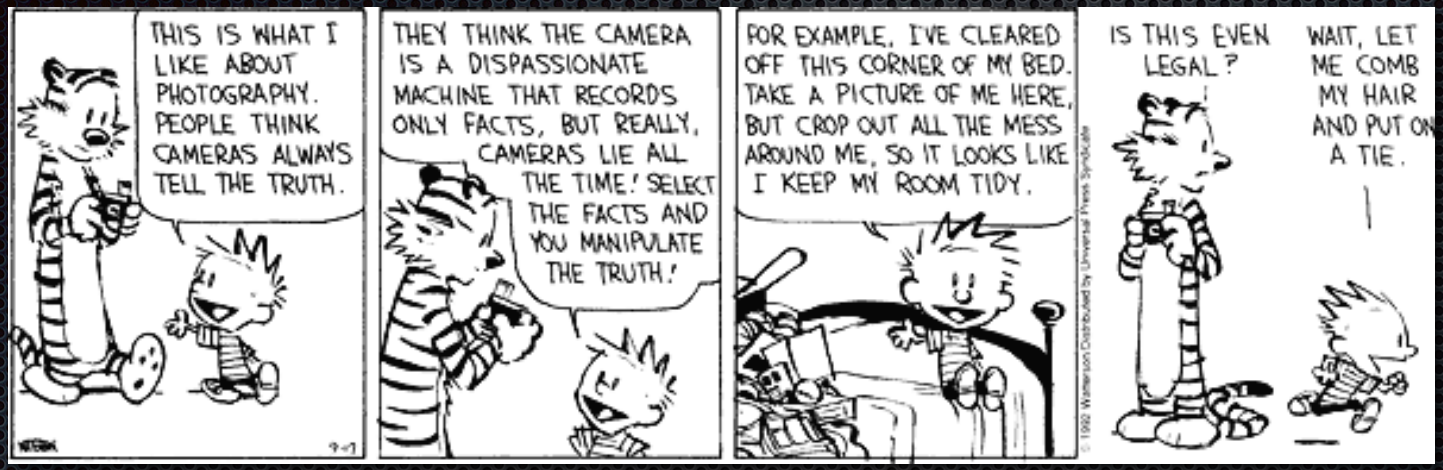


"Is this what it really looks like?"

"Are the colors real?"

"If I were standing next to it, is this what it would look like?"

The Camera as a Record of Reality...



NO...

- Surface brightness is constant
- Can't see color in faint light
- Poor sensitivity to red light
- Eyes can't see all kinds of light

The 3 Goals of a Telescope

Magnify

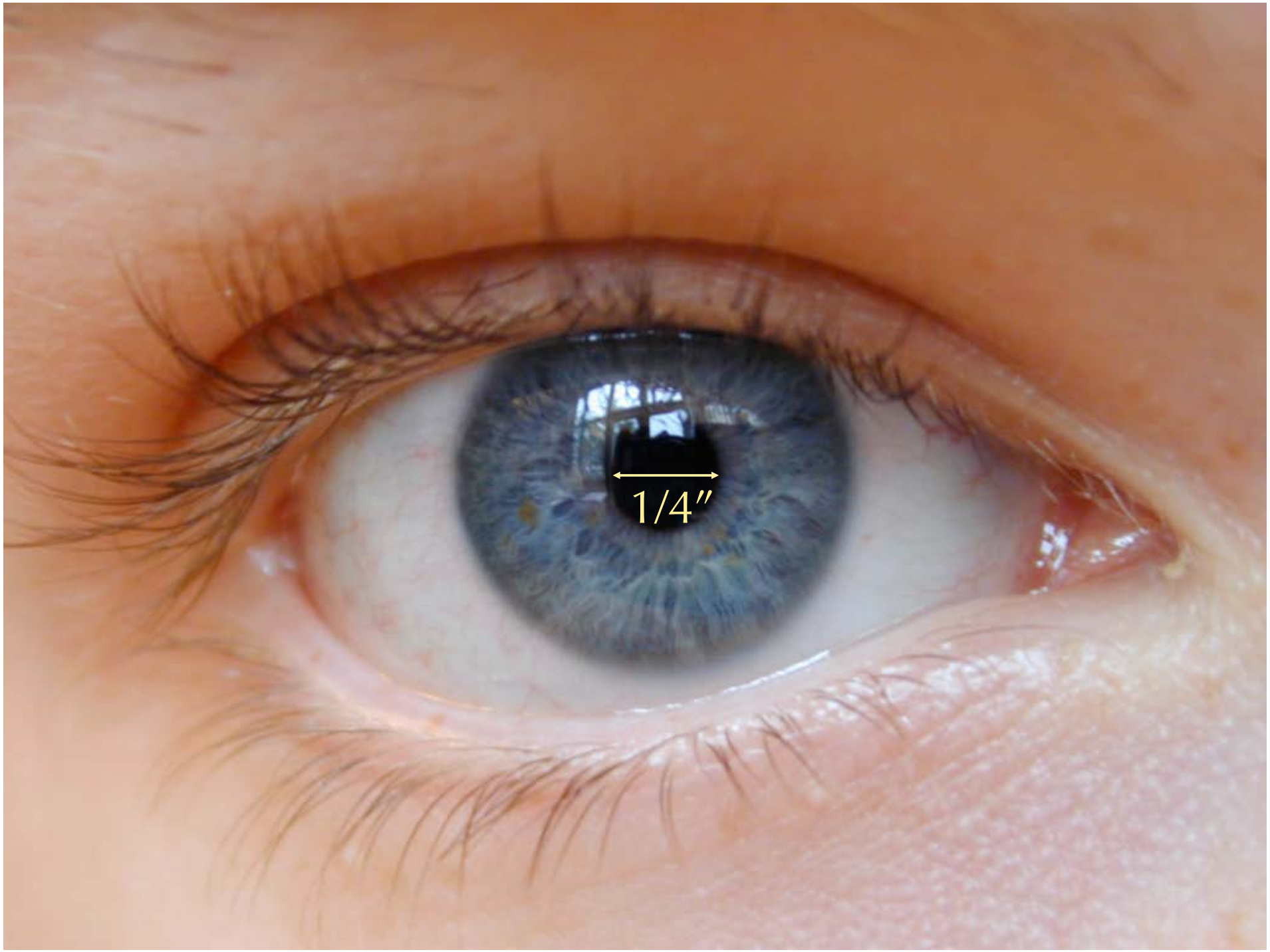
(make small things appear bigger)

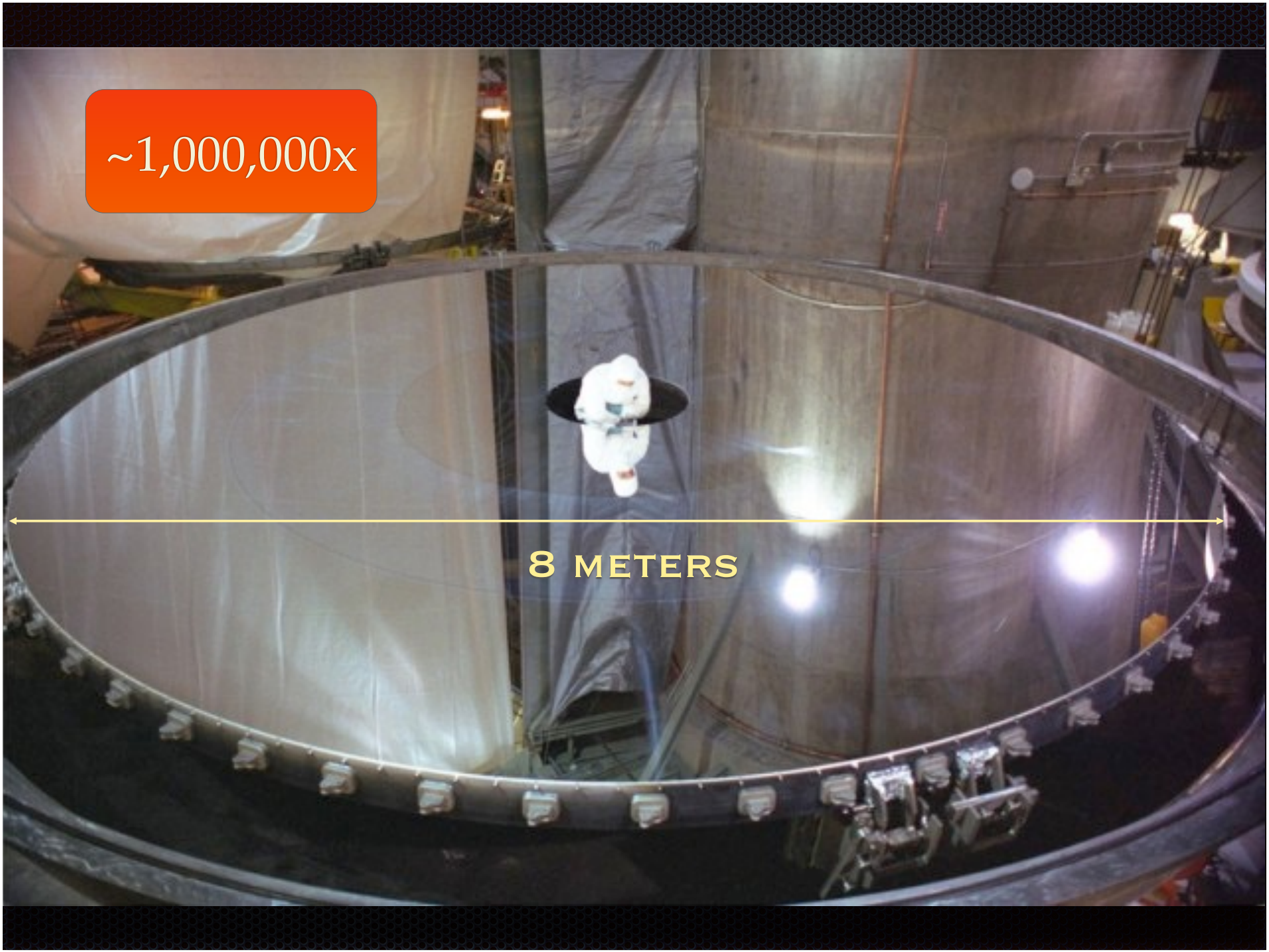
Collect light

(make faint things appear brighter)

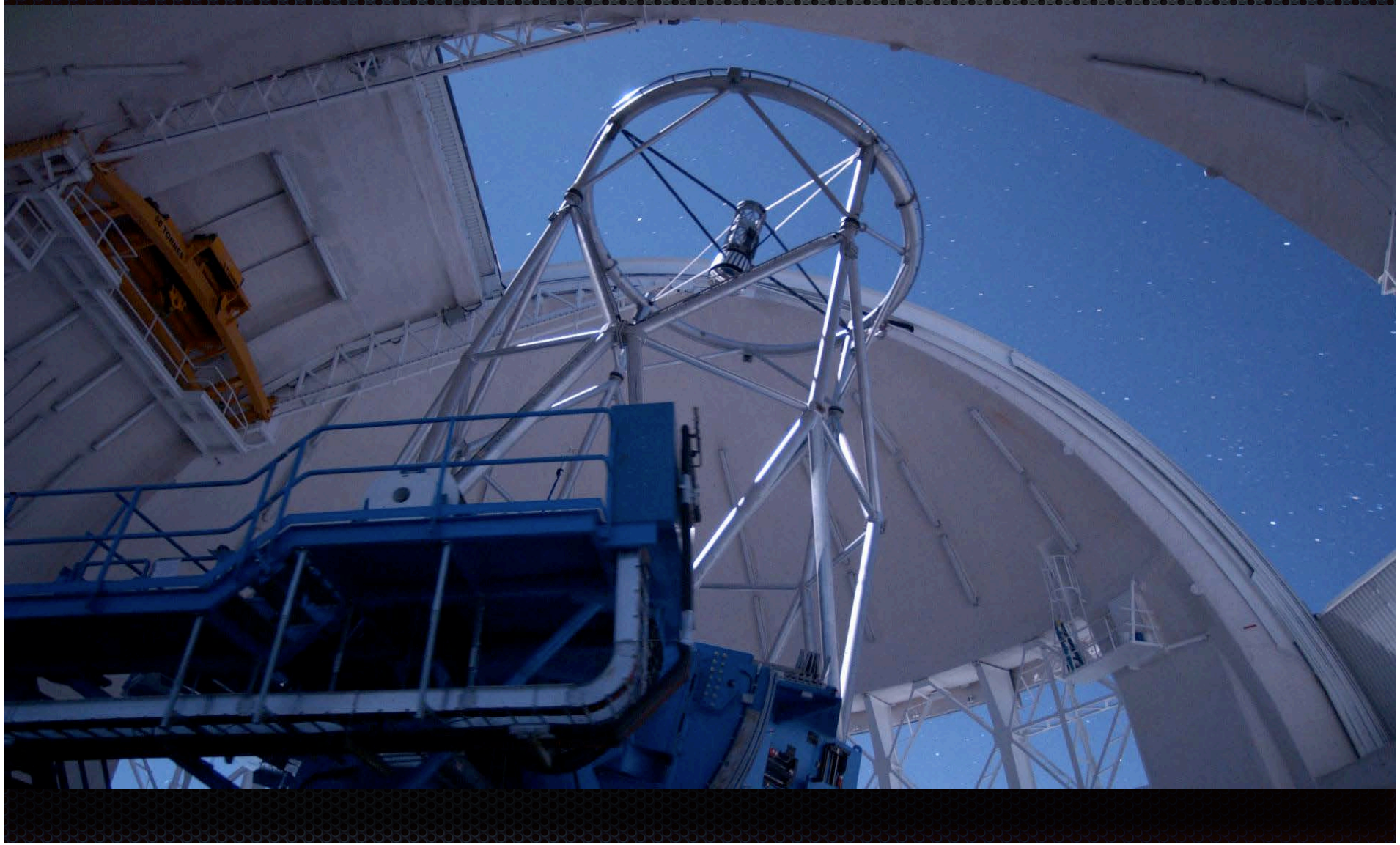
Expand vision

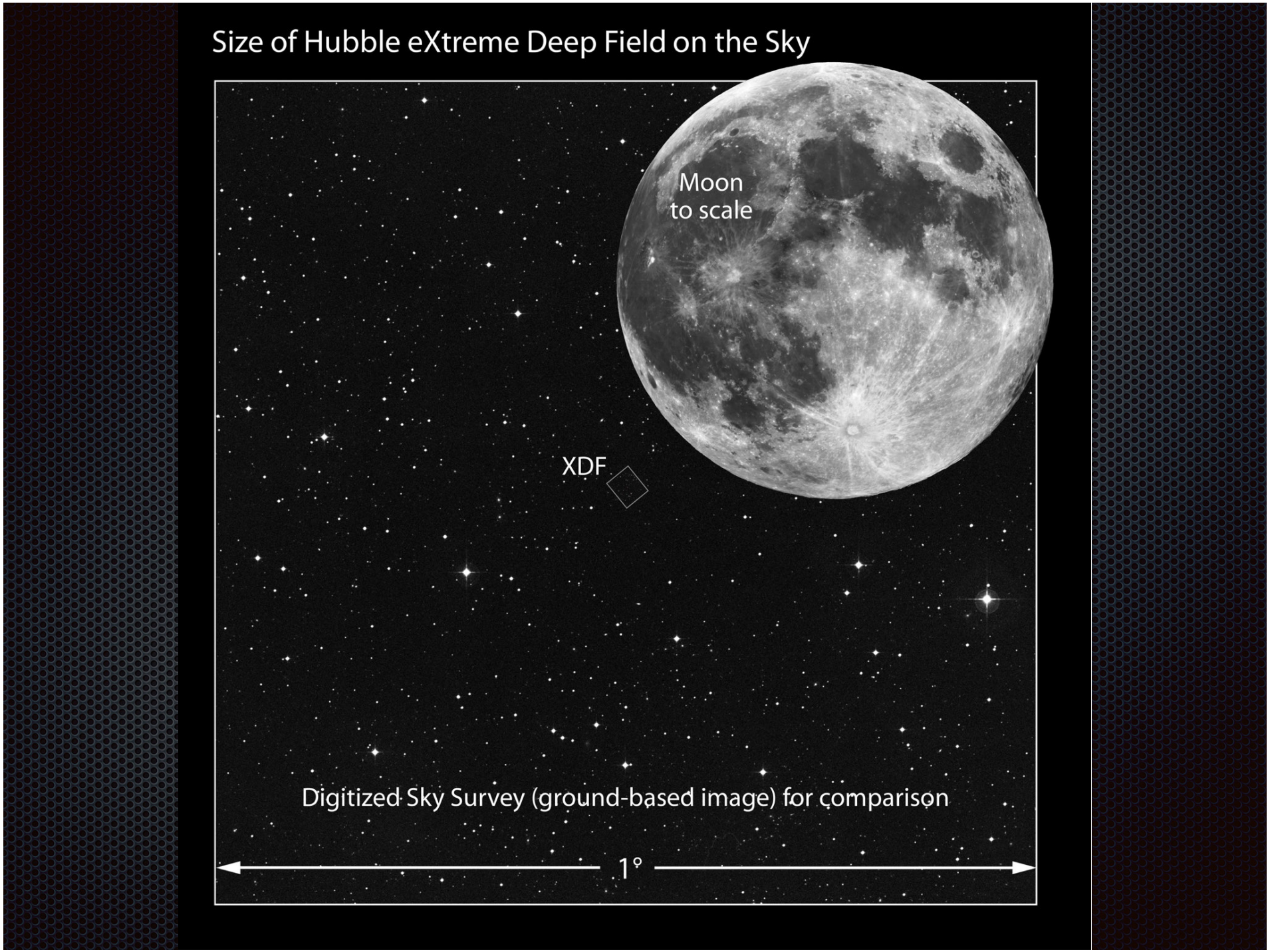
(see kinds of light our eyes can’t see)

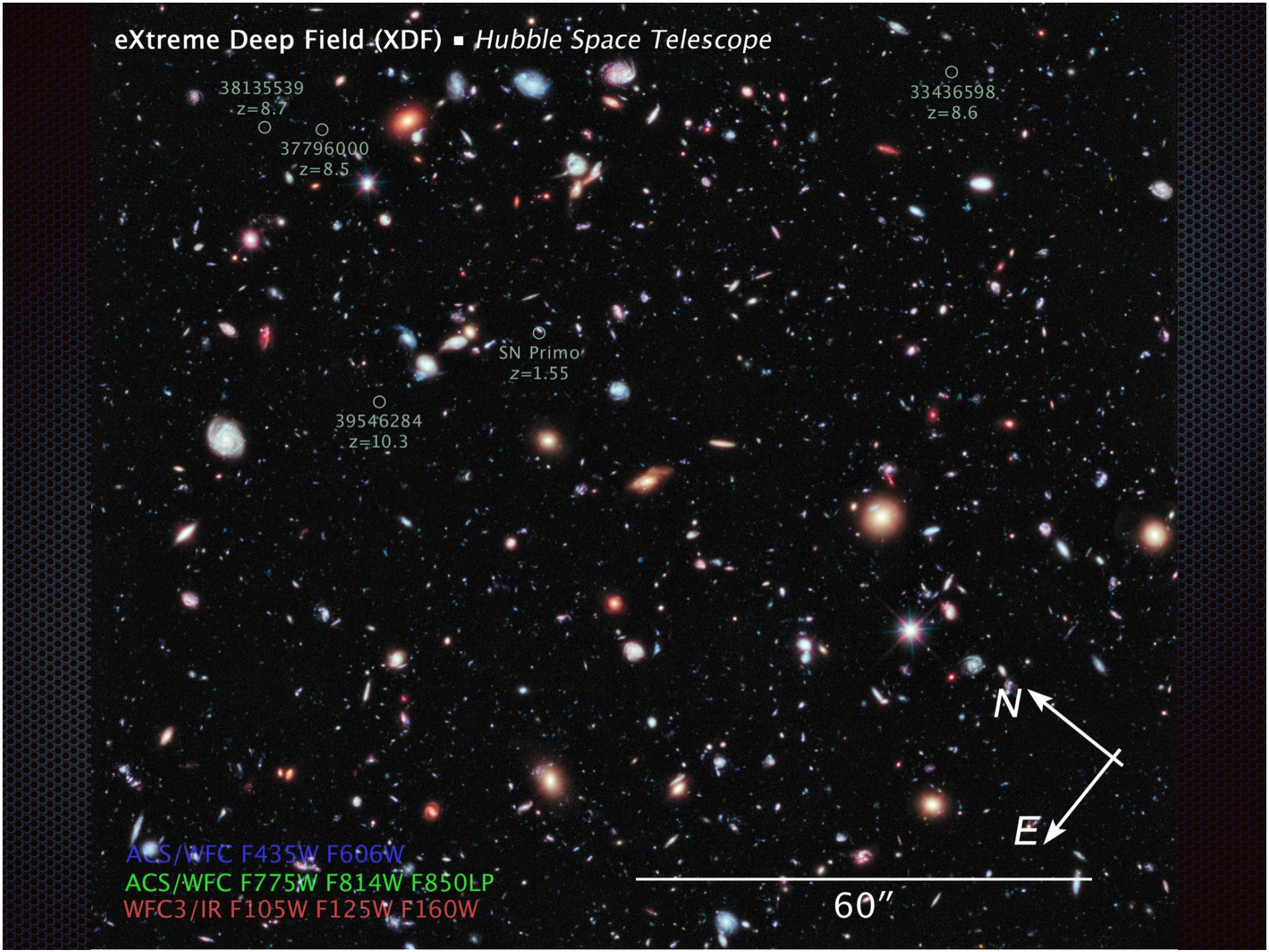

1/4″


~1,000,000x
8 METERS

Long Exposures!




Size of Hubble eXtreme Deep Field on the Sky
Moon
to scale
XDF
Digitized Sky Survey (ground-based image) for comparison
1°


eXtreme Deep Field (XDF) ▪ *Hubble Space Telescope*
38135539
z=8.7
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z=8.6
SN Primo
z=1.55
39546284
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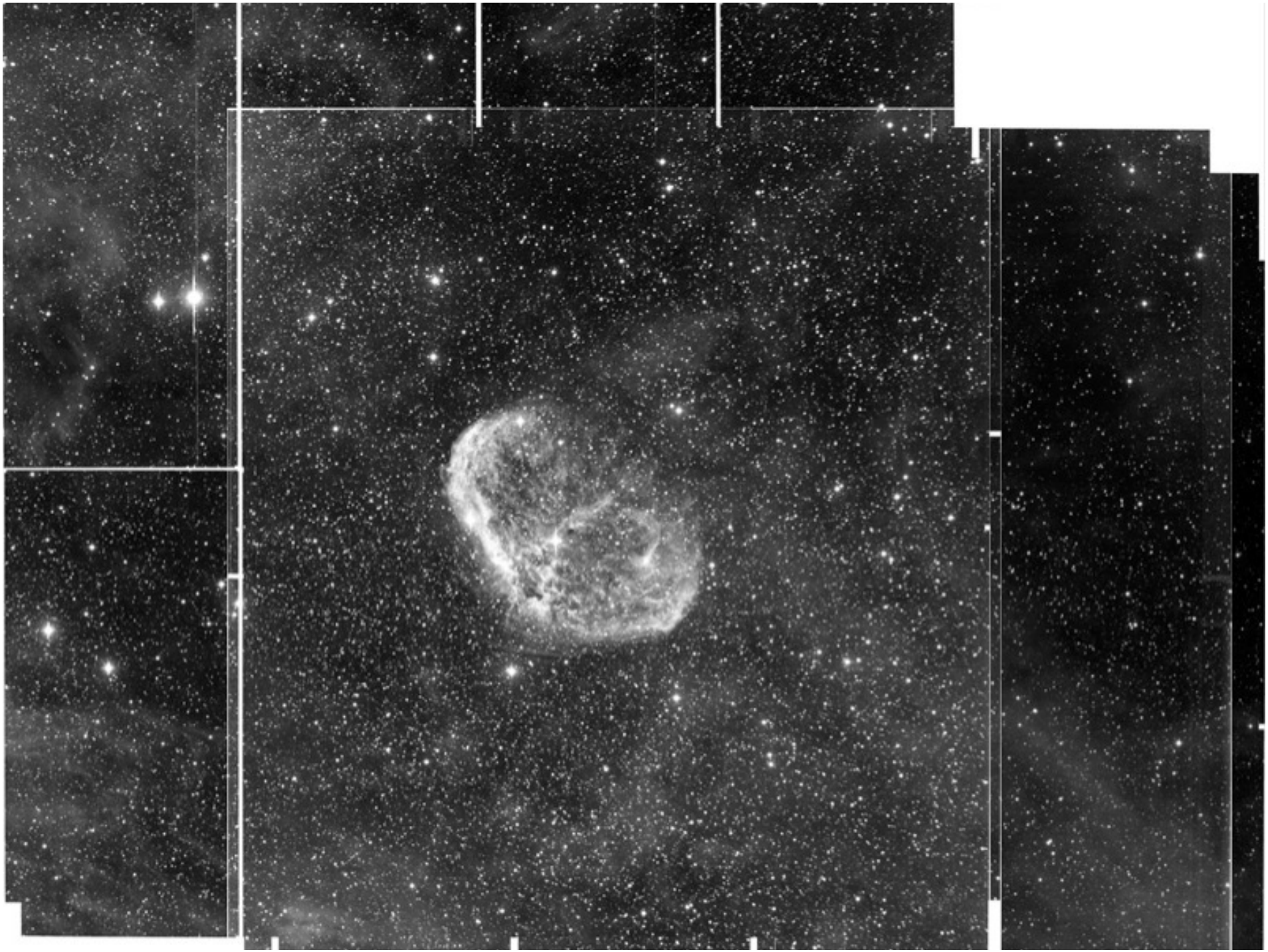
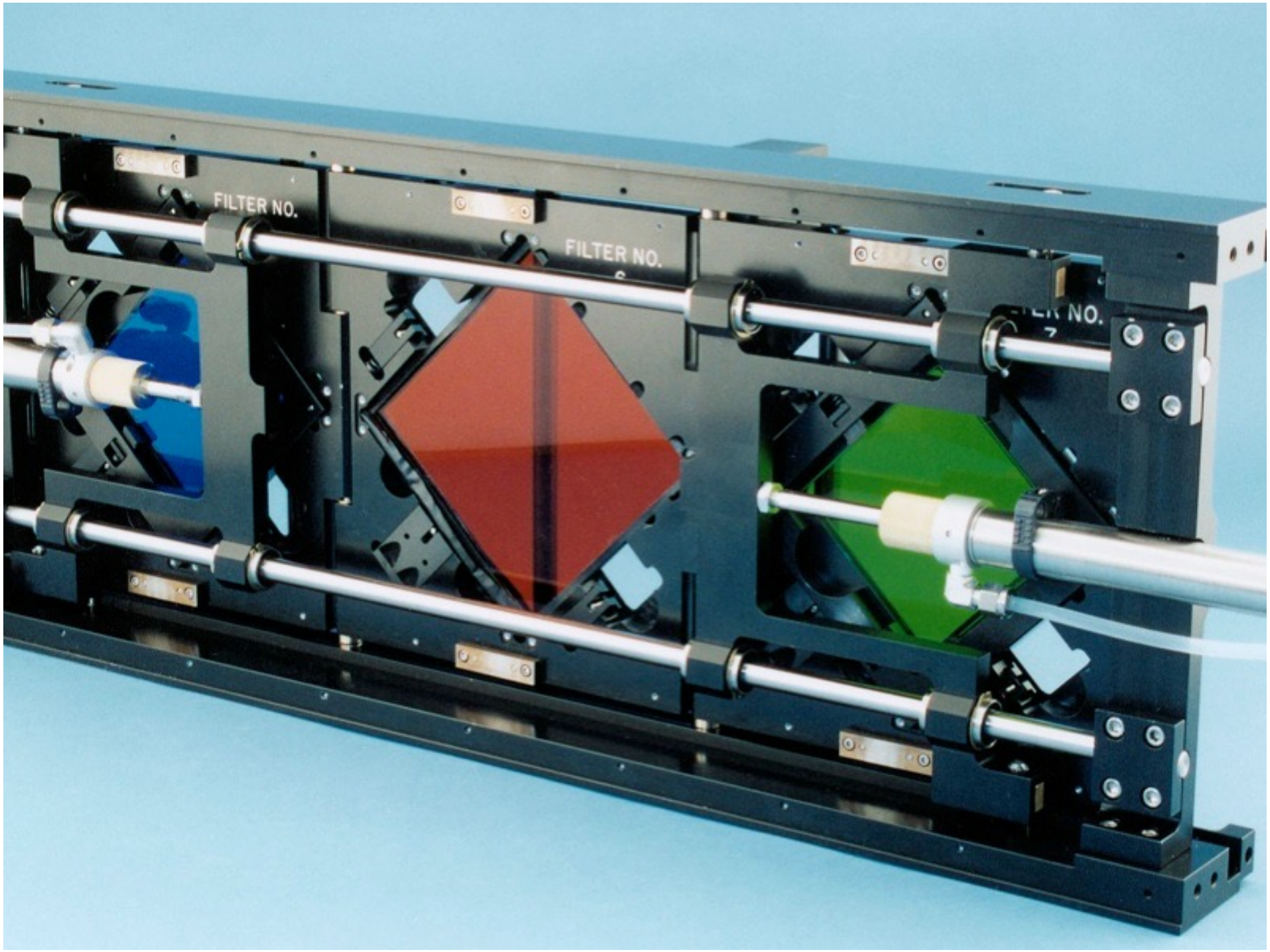
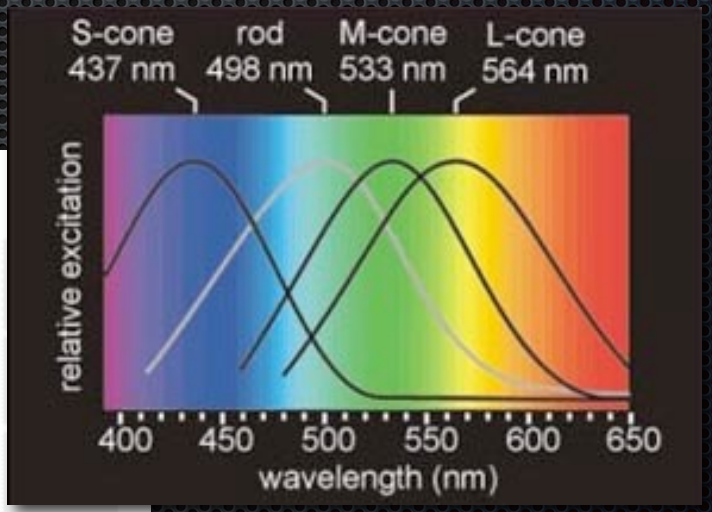
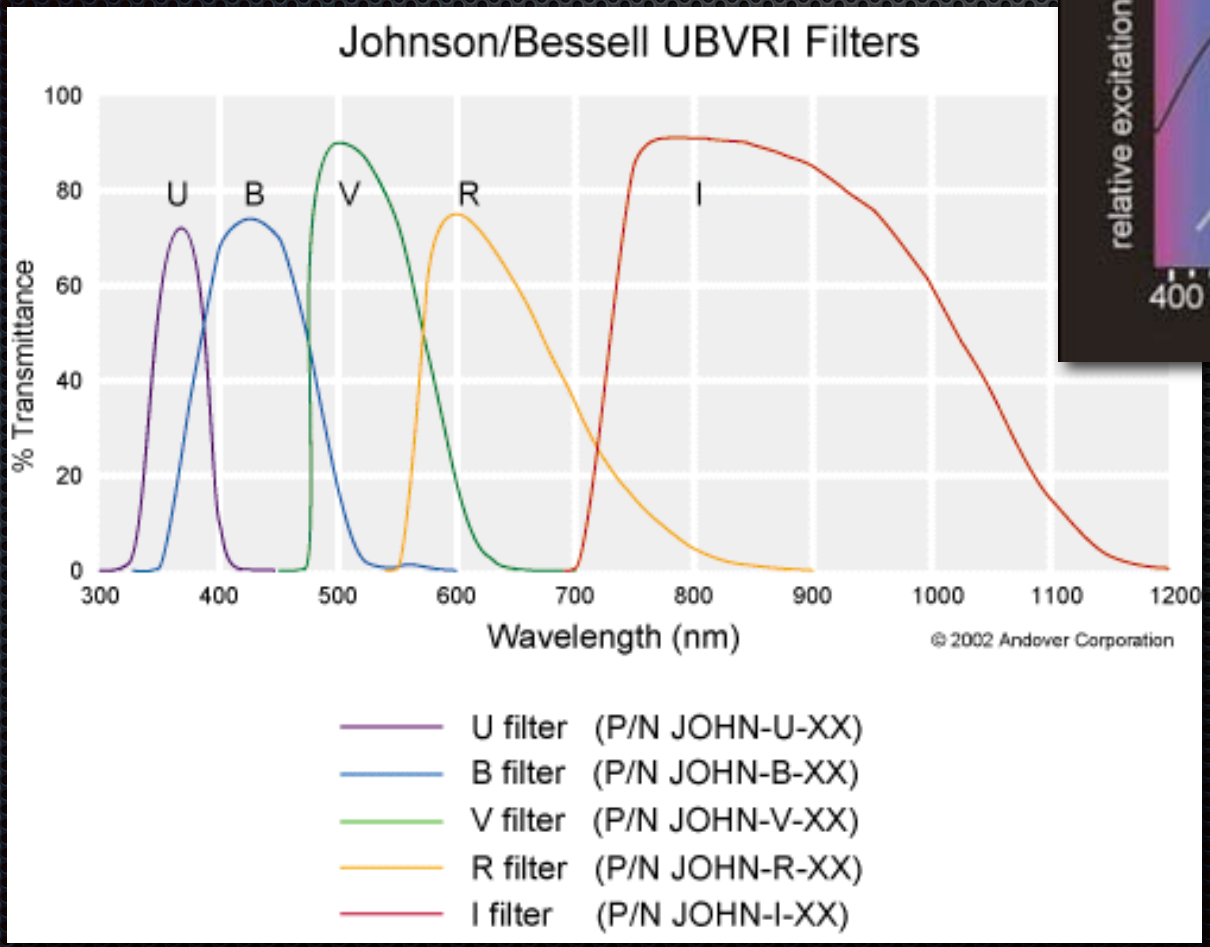



FILTER NO.
FILTER NO.

Broadband Images

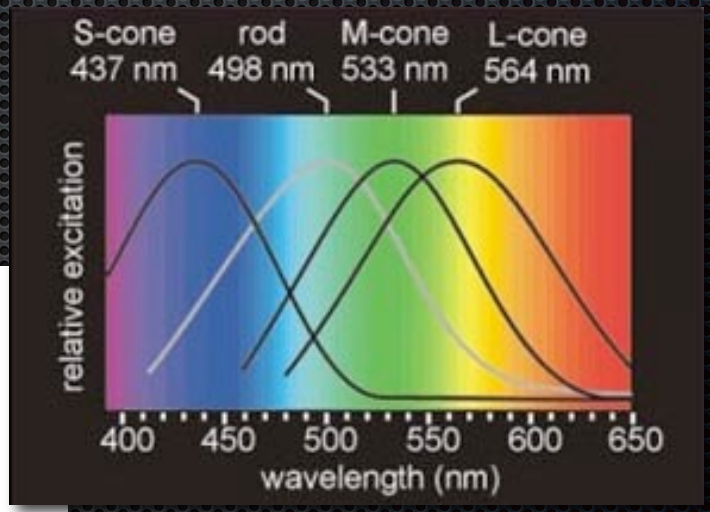


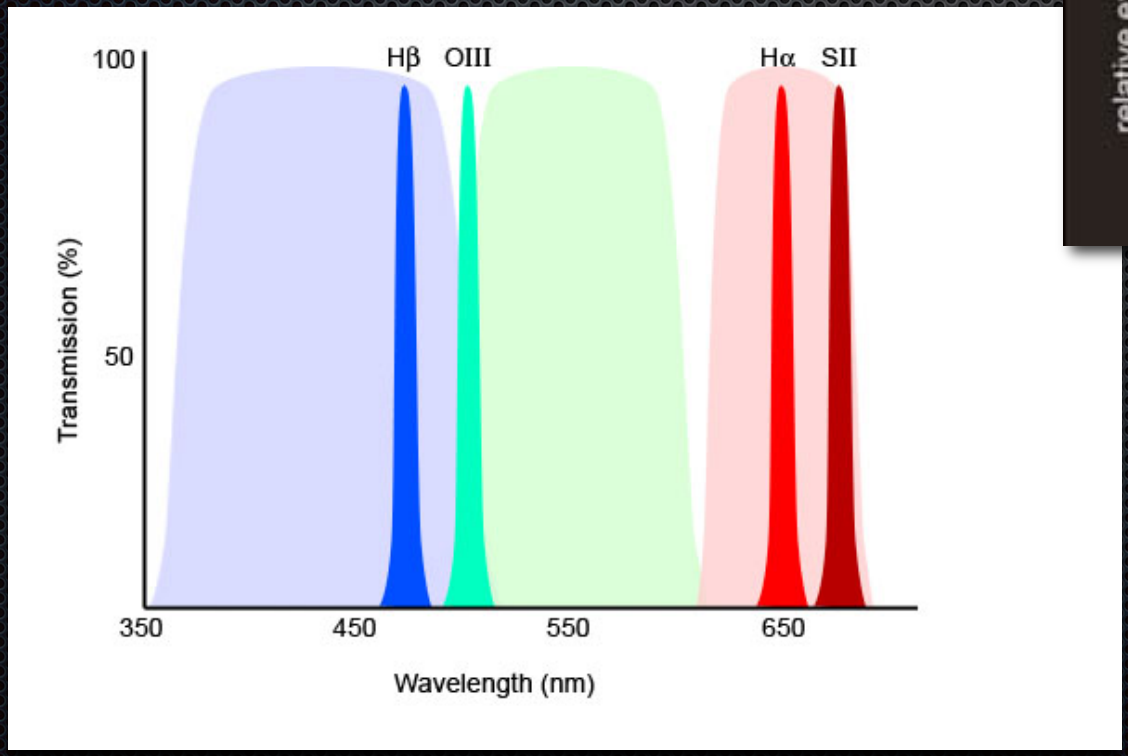


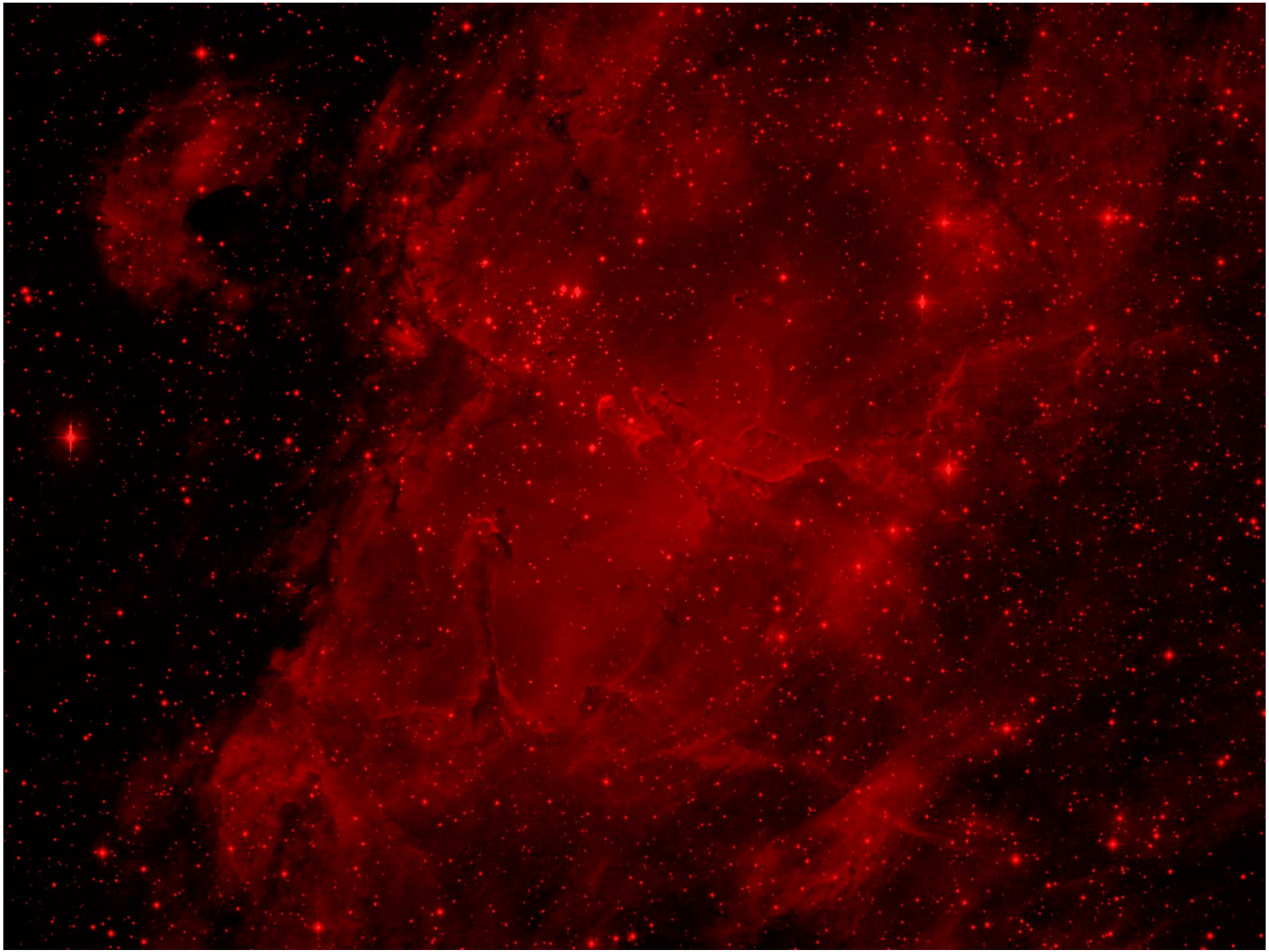
Multiband Images

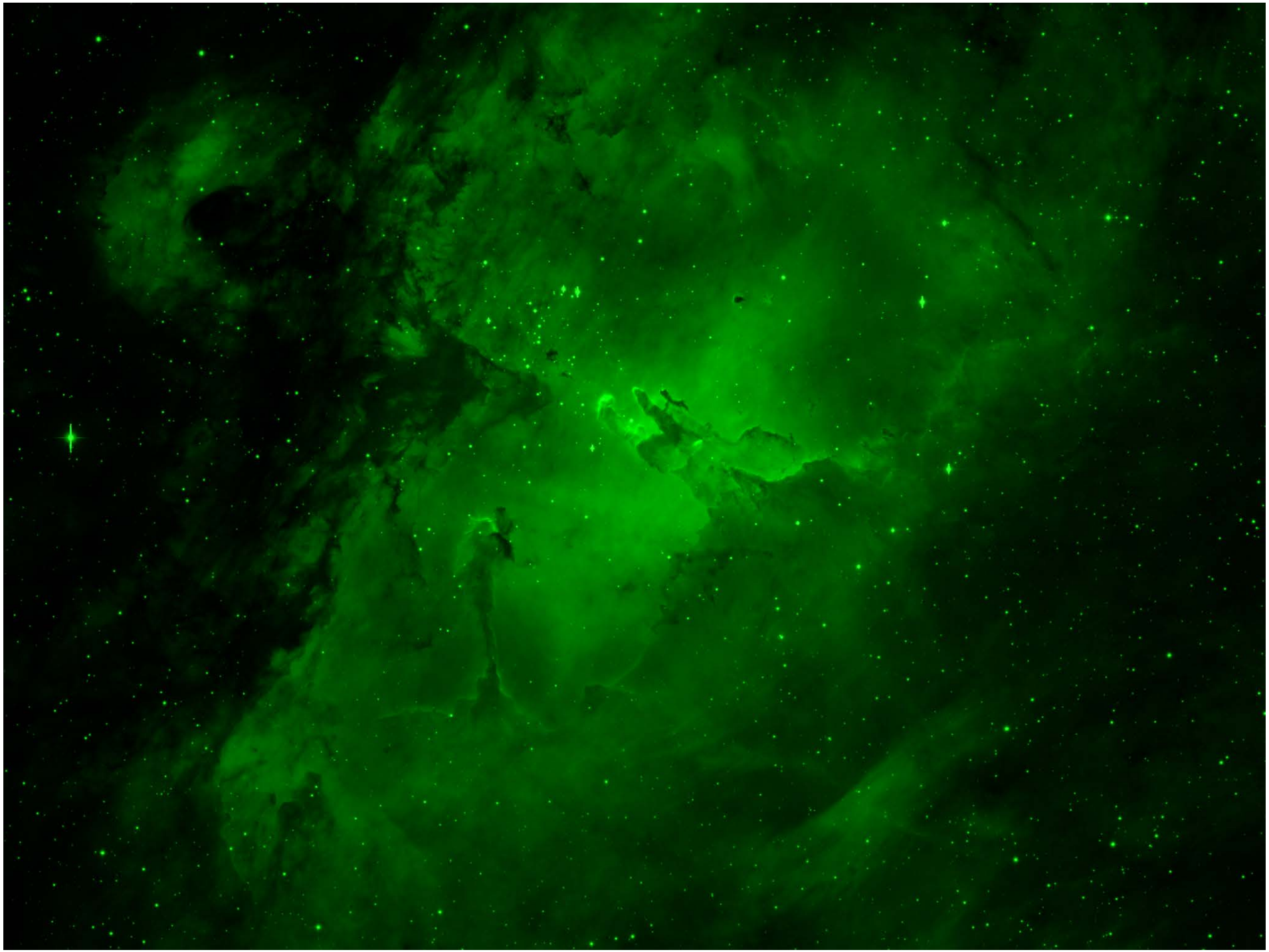
NGC 6822 in three filters (left) and in eight filters (right)

Narrowband Images





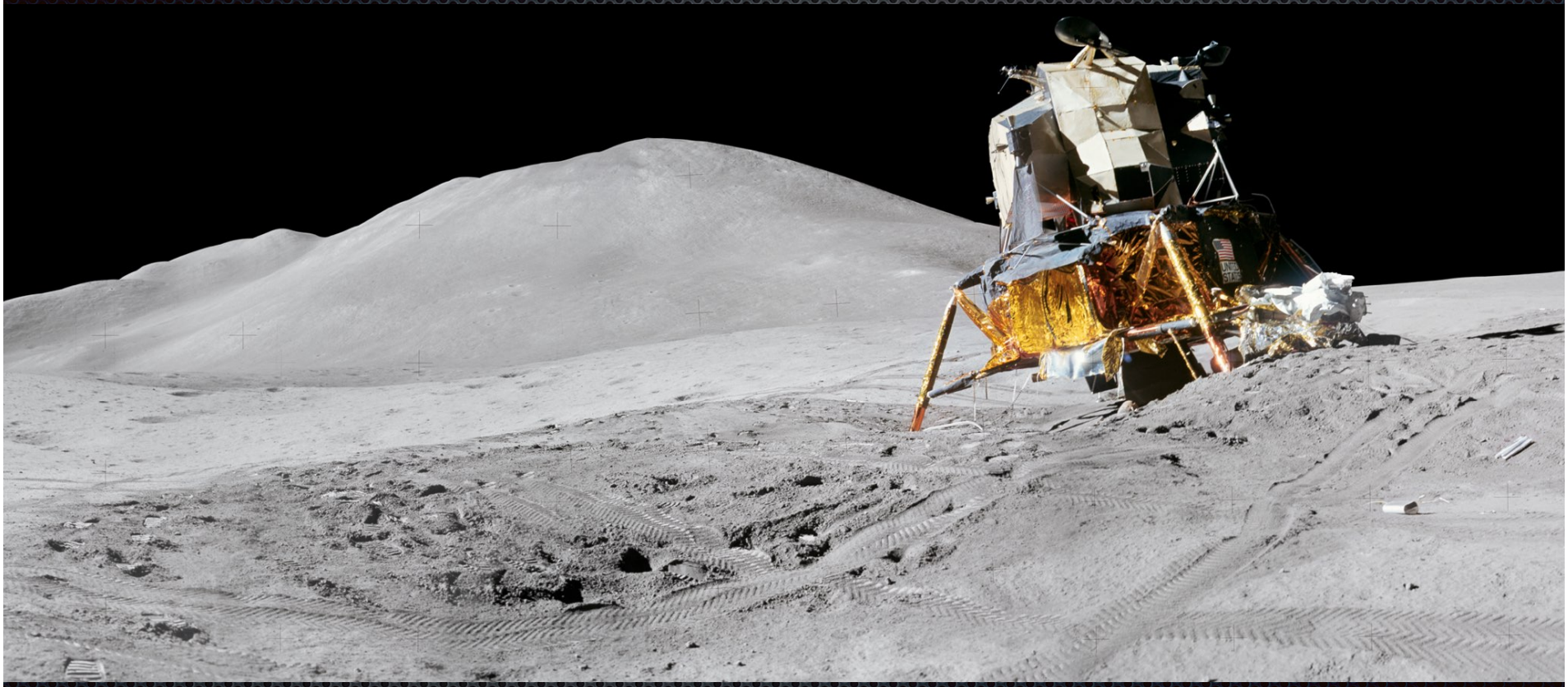




Visual Grammar

Color can imply depth, motion and temperature

Visual Grammar



Color can imply depth, motion and temperature

Visual Grammar

Lagoon Nebula Detail HST • WFPC2

PRC96-38b • ST ScI OPO • January 22, 1997
A. Caulet (European Southern Observatory) and NASA

Visual Grammar

Keyhole Nebula

Hubble Heritage

NASA and The Hubble Heritage Team (STScI) • Hubble Space Telescope WFPC2 • STScI-PRC00-06

Keyhole Nebula

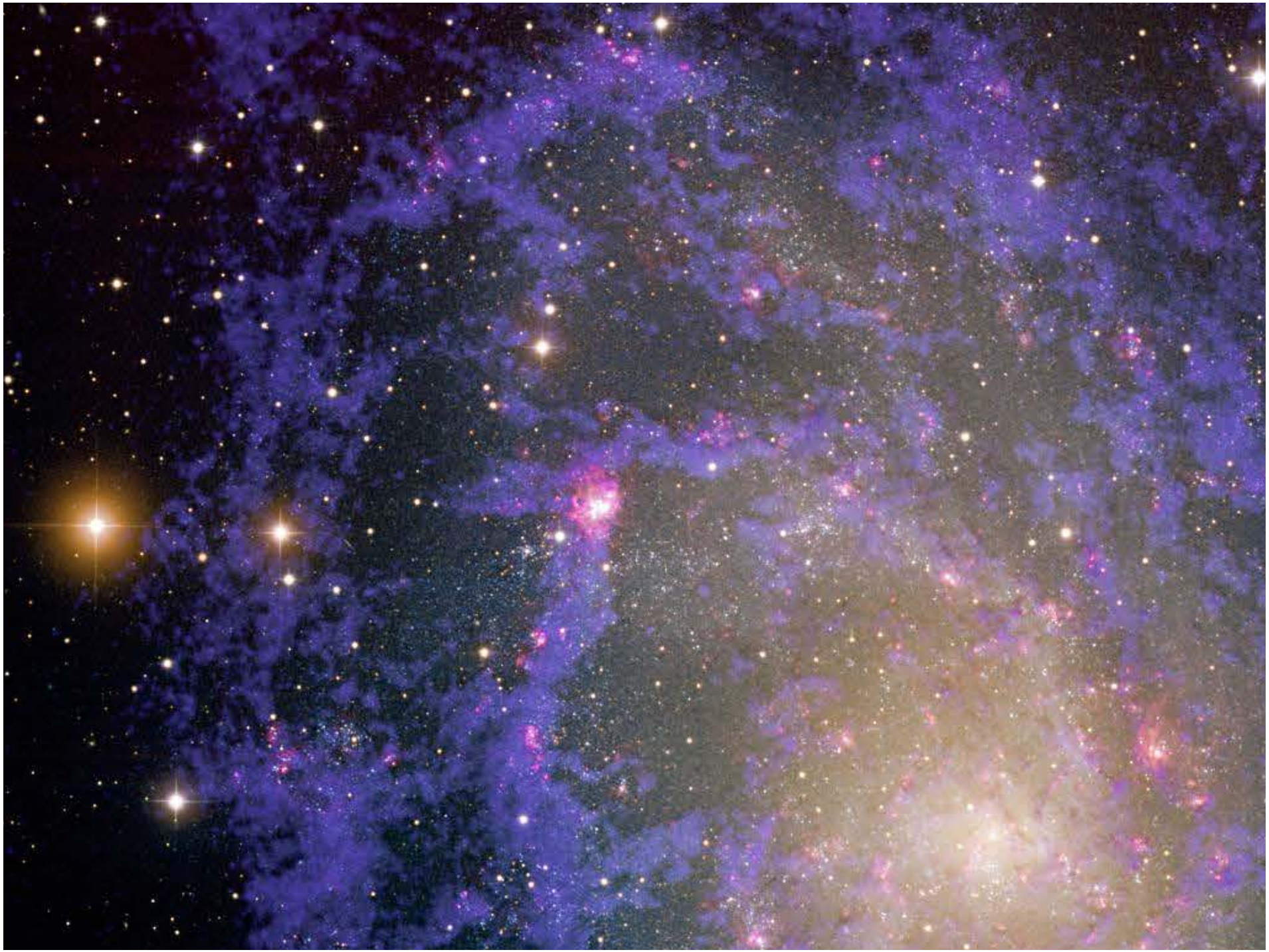
Hubble Heritage

NASA and The Hubble Heritage Team (STScI) • Hubble Space Telescope WFPC2 • STScI-PRC00-06

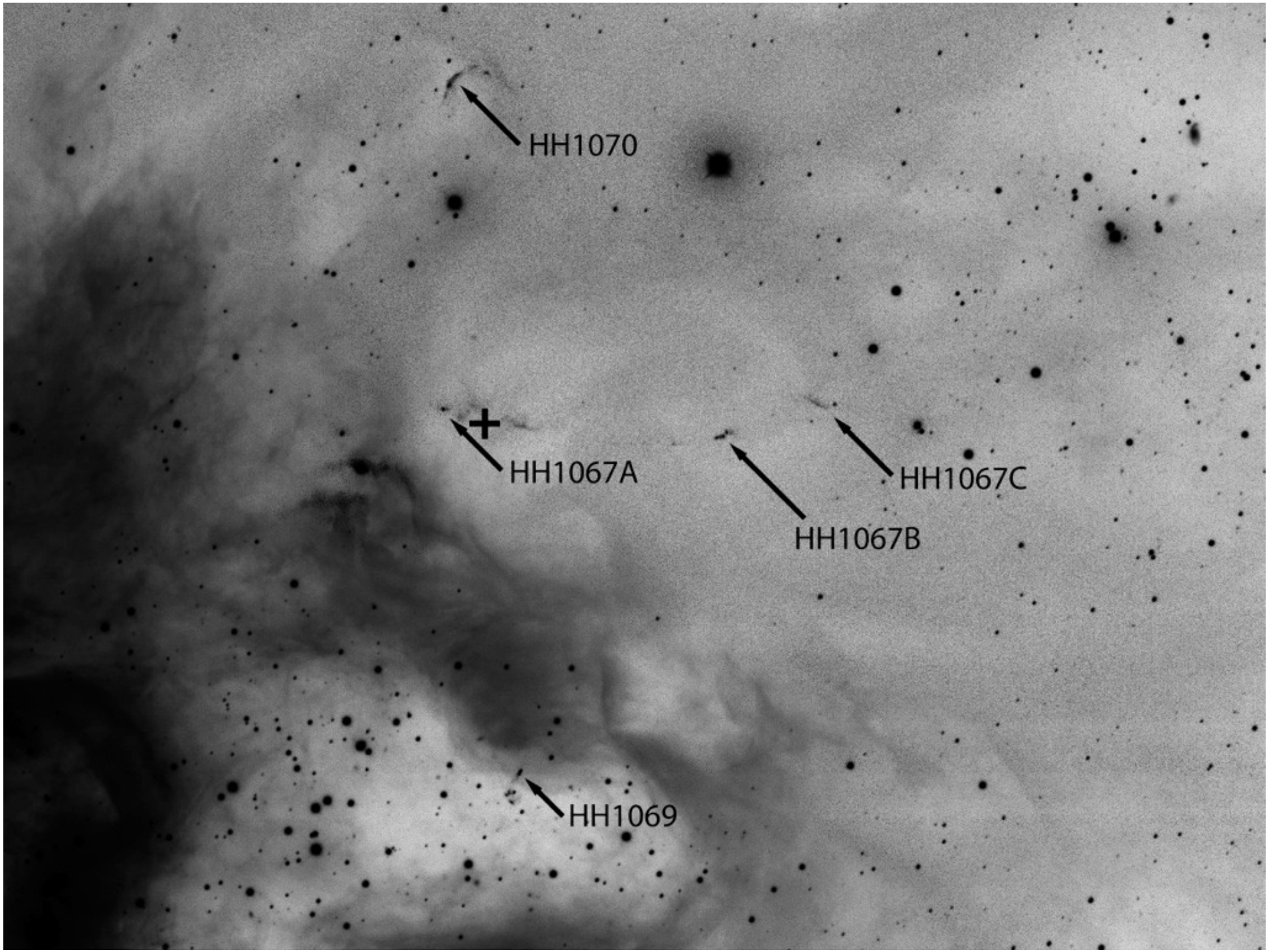
Visual Grammar

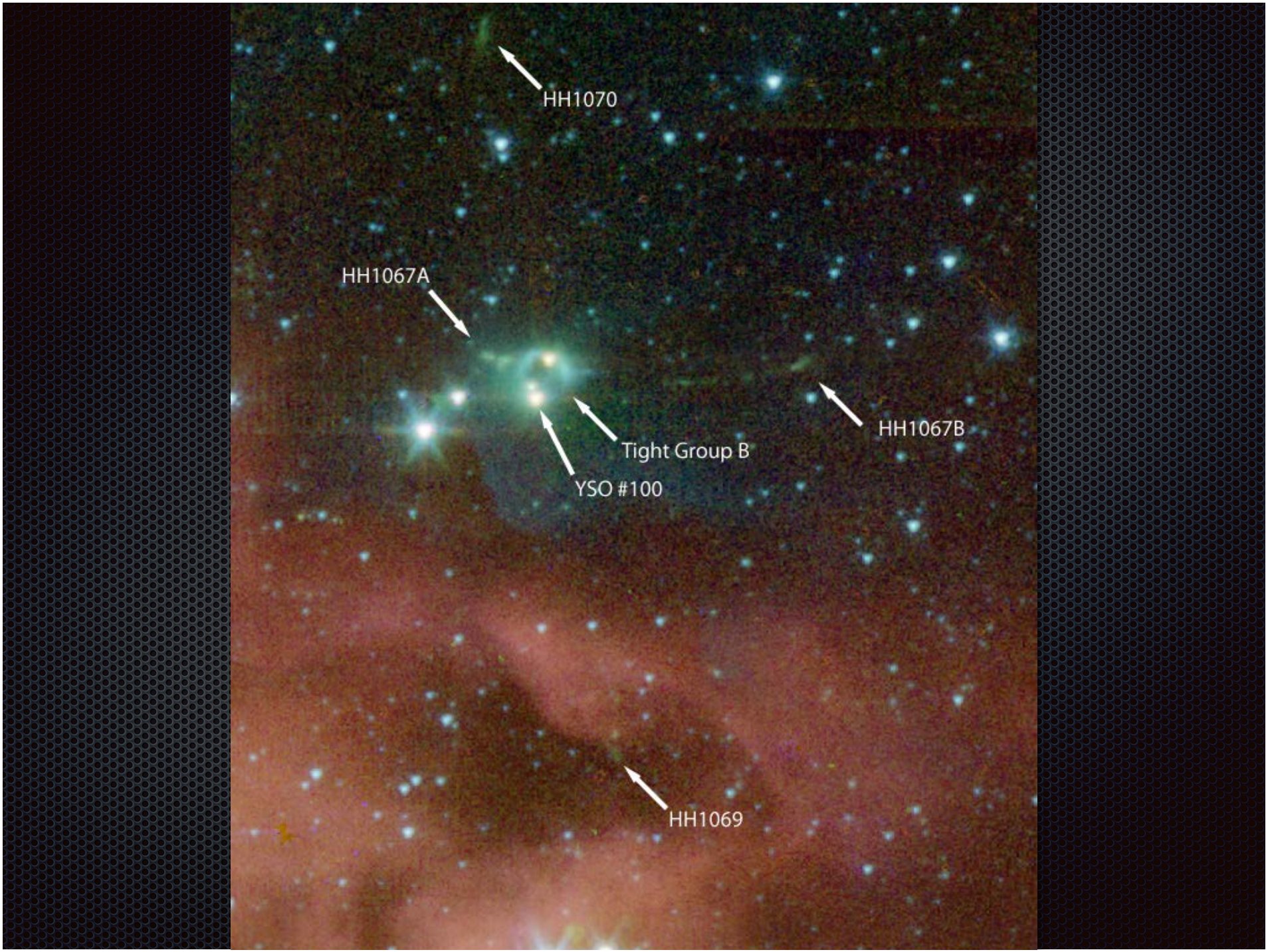
What's the Story?

M33 in optical only (left) and in optical and radio (right)



Scientific *and* Beautiful


HH1070
HH1067A
HH1067B
HH1067C
HH1069


HH1070
HH1067A
HH1067B
Tight Group B
YSO #100
HH1069

Dr. Travis Rector – Astrophysics & Astrophotograpy

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Astrophysics & Astrophotography

Dr. Travis A. Rector

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  - Wide Field Images
  - Panoramas
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Welcome

I am an astronomer at the University of Alaska Anchorage. This website is devoted primarily to my astrophotography. If you're interested in my resesarch, you may download my publications from NASA ADS and preprints from arXiv.org.

The links to the left contain astronomical images I have made over the last 15 years, for my research and for fun. I hope you enjoy viewing them as much as I have enjoyed making them.

The Deep Sky Image gallery contains images I have created with telescopes at Gemini Observatory, the National Optical Astronomy Observatory and the National Radio Astronomy Observatory.

The Wide Field Image gallery contains images from digital cameras and traditional 35mm film photography.

The Panorama gallery contains images from digital cameras that were stitched together. These are of observatories I use for my research, as well as some of beautiful Alaska.

Many of these images will look too dark on an uncalibrated monitor. For best viewing, please read these tips on how to view these images. If you have any questions about these images, please read my FAQ sheet, or feel free to contact me.

If you would like to be notified when new images are added to the website, please subscribe via the contact page

Newest Images

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NGC 2770

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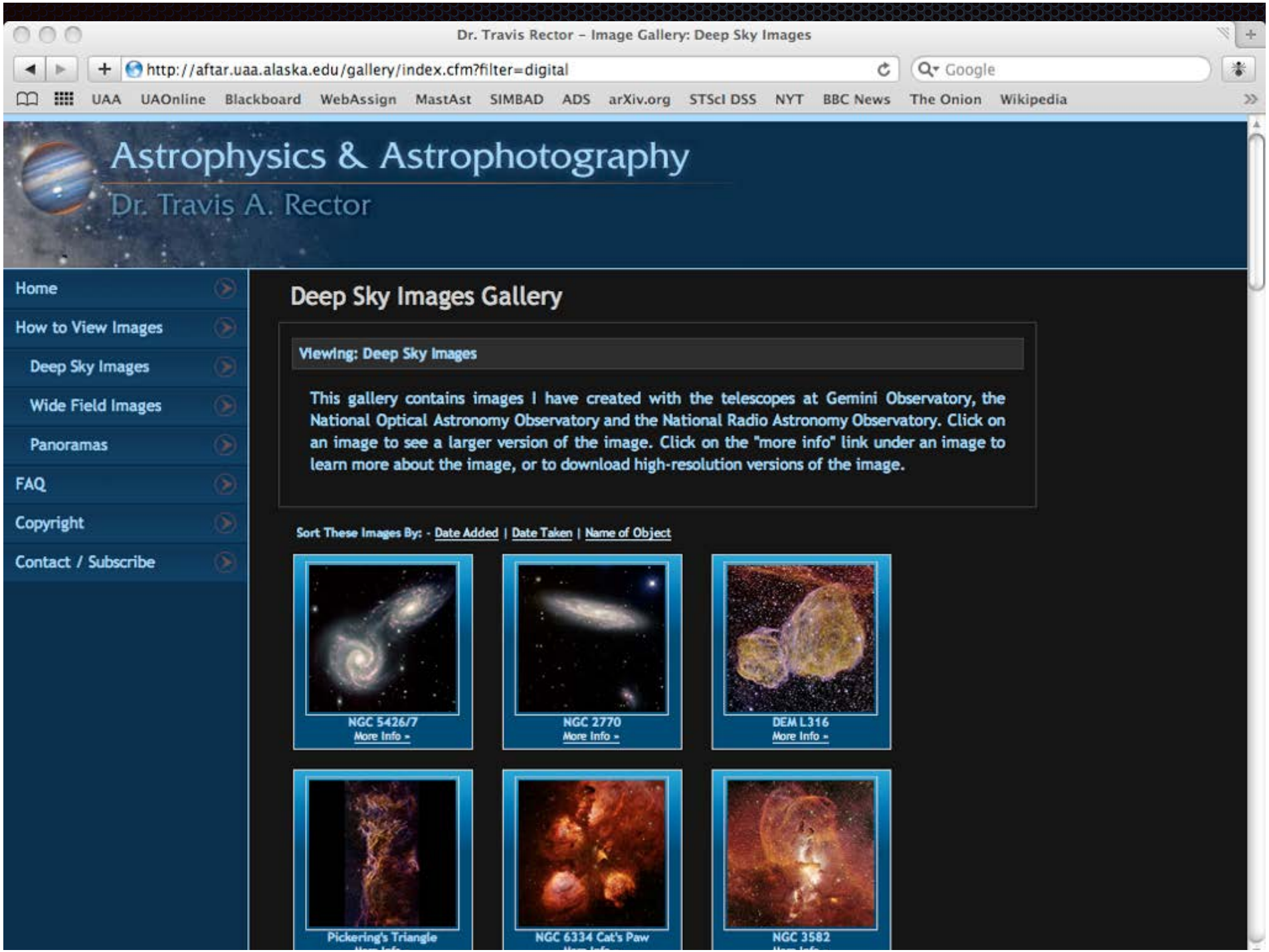
Dr. Travis Rector – Image Gallery: Deep Sky Images
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Deep Sky Images Gallery
Viewing: Deep Sky Images
This gallery contains images I have created with the telescopes at Gemini Observatory, the National Optical Astronomy Observatory and the National Radio Astronomy Observatory. Click on an image to see a larger version of the image. Click on the "more info" link under an image to learn more about the image, or to download high-resolution versions of the image.
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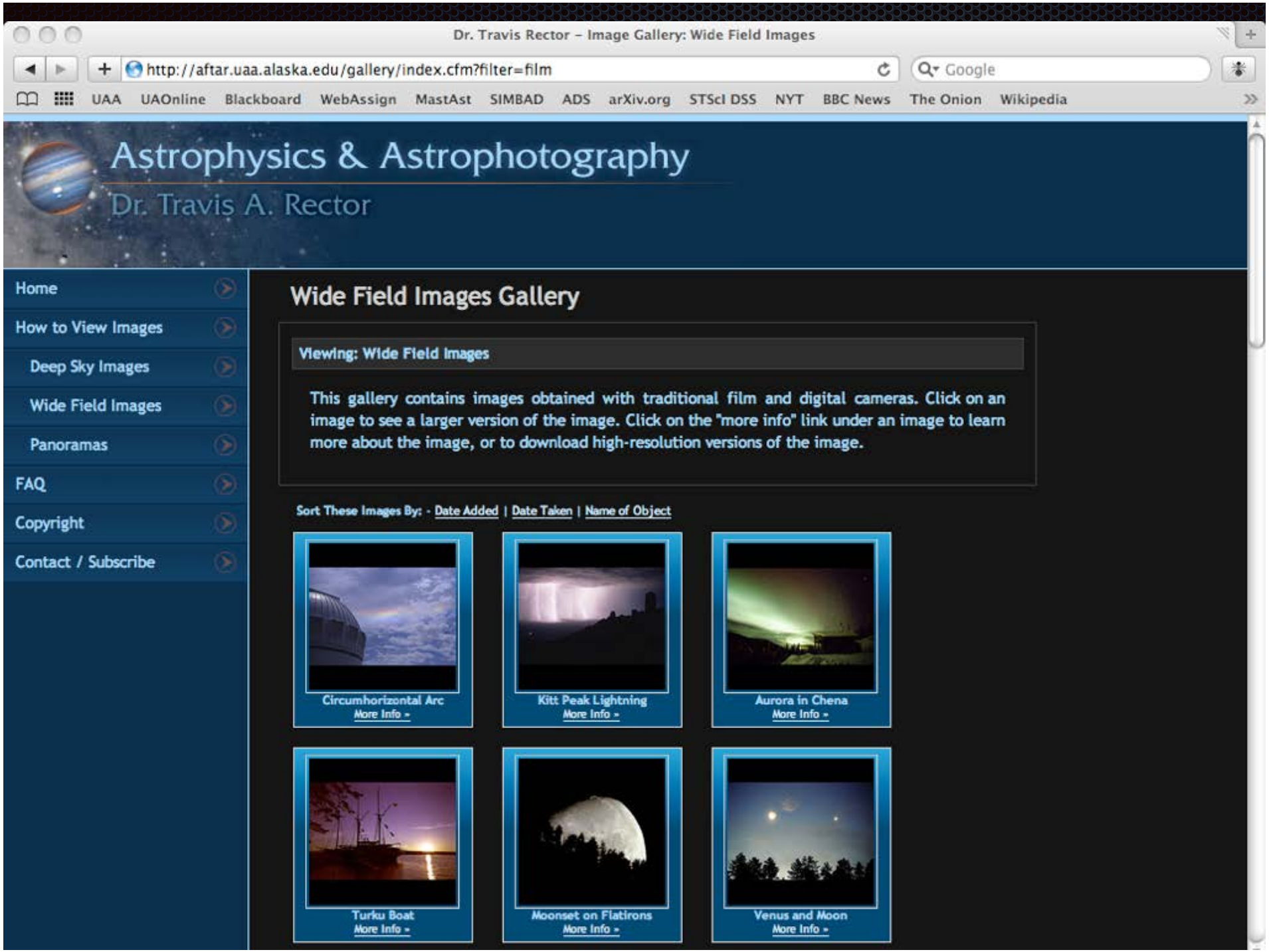
DEM L316
More Info »
Pickering's Triangle
NGC 6334 Cat's Paw
NGC 3582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Viewing: Wide Field Images
This gallery contains images obtained with traditional film and digital cameras. Click on an image to see a larger version of the image. Click on the "more info" link under an image to learn more about the image, or to download high-resolution versions of the image.
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Kitt Peak Lightning
More Info »
Aurora in Chena
More Info »
Turku Boat
More Info »
Moonset on Flatirons
More Info »
Venus and Moon
More Info »

Dr. Travis Rector – Image Gallery: Panoramic Images

http://aftar.uaa.alaska.edu/gallery/index.cfm?filter=pano

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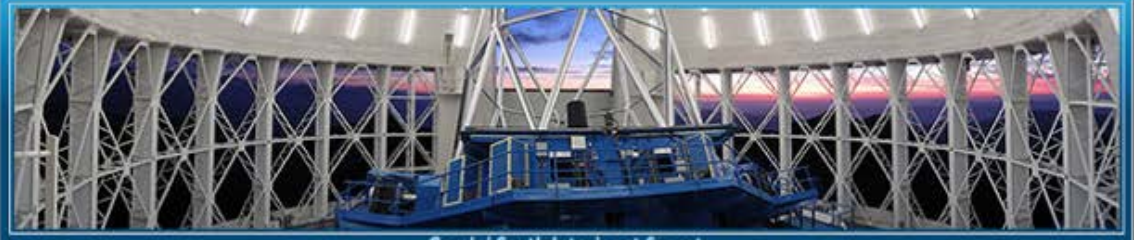
Panoramic Images

Viewing: Panoramic Images

This gallery contains images obtained with a digital camera and stitched together. Click on an image to see a larger version of the image. Click on the "more info" link under an image to learn more about the image, or to download high-resolution versions of the image.

Sort These Images By: - Date Added | Date Taken | Name of Object

Kitt Peak Sunset
More Info »



Gemini South Interior at Sunset
More Info »


AN INSIDER'S LOOK AT MAKING SPECTACULAR IMAGES OF SPACE
Dr. Travis A. Rector, Kimberly Arcand, and Megan Watzke
COLORING THE UNIVERSE

Books

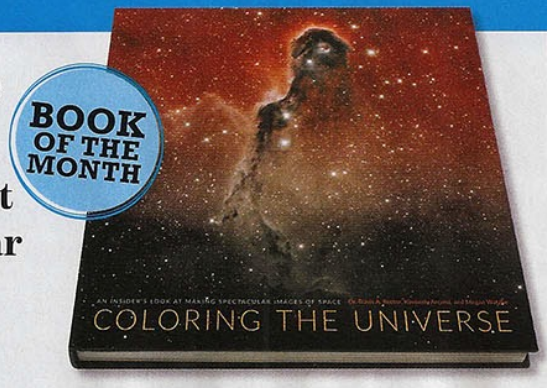
New astronomy and space titles reviewed

RATINGS

★★★★★ Outstanding
★★★★☆ Good
★★★☆☆ Average
★★☆☆☆ Poor
★☆☆☆☆ Avoid

Coloring the Universe

An Insider's Look at Making Spectacular Images of Space



Travis Rector, Kimberly Arcand, Megan Watzke
University of Alaska Press
£35 ● HB

The back cover of *Coloring the Universe* sets out its pitch in no uncertain terms. "This is not your typical astronomy book," it proclaims, while the blurb goes on to distance the volume from "coffee table books full of pretty astronomy pictures". But if you're a fan of eye-popping space imagery don't be put off: this tome is bursting at the seams with some very pretty astronomy pictures indeed.

The book is squarely aimed at the US market and this results in my only quibble: the resolute avoidance of metric units throughout the text. It surely wouldn't have hurt to include metric figures in brackets, if only as an insight into the language in which astronomy is actually conducted. But this is a very minor complaint. A nod must also go to the book's designers: it is beautifully laid out in a way that does full justice to the images, with some nice design flourishes that lend it the luxurious feel

TWO MINUTES WITH TRAVIS RECTOR

What inspired you to write the book?
Over the past 20 years I have taken colour images of space with telescopes at Kitt Peak National Observatory and the Gemini Observatory, among others. My co-authors Kim Arcand and Megan Watzke work for NASA's Chandra X-Ray Observatory. People often ask us about the accuracy of the images and how they are made. We wanted to write a book that answers these questions and more.

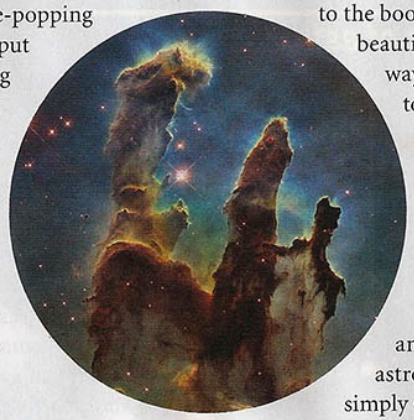
How does the real Universe differ from the pictures seen in books?
Our pictures show real stars, galaxies and nebulae: they aren't the creative imaginations of graphic artists. But almost everything in space is too faint to see. You could fly a spaceship to the Horsehead Nebula and it would still look black. Telescopes are able to see objects over a billion times fainter than

Making Spectacular Images of Space

Travis Rector, Kimberly Arcand, Megan Watzke
University of Alaska Press
£35 ● HB

The back cover of *Coloring the Universe* sets out its pitch in no uncertain terms. "This is not your typical astronomy book," it proclaims, while the blurb goes on to distance the volume from "coffee table books full of pretty astronomy pictures". But if you're a fan of eye-popping space imagery don't be put off: this tome is bursting at the seams with some very pretty astronomy pictures indeed.

What singles this book out is how it lifts the curtain on the processes by which these spectacular images are made. There are explanations of the astrophysics of celestial objects, how telescopes and cameras capture and record light, as well as the software techniques used to create these striking images. But you'll also find discussions on the science of perception in the human eye and brain, as well as topics that veer into the realms of art theory. If you're curious to know why hydrogen is an important element in astronomy and how Hubble's iconic 1995 image Pillars of Creation owes a debt to 19th-Century landscape painting, you'll find the answers to such questions in these pages.



How much does the iconic Pillars of Creation image owe to landscape painting?

NASA/ESA AND THE HUBBLE HERITAGE TEAM (STSCI/AURA)

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Whether you're an experienced astrophotographer or simply someone who loves beautiful space pictures and wants insight into how they're created, *Coloring the Universe* hits the spot. It's true that this is not your typical astronomy book, and after reading it you'll probably never look at an astronomy image in quite the same way again. Nevertheless, I can guarantee it's going to look amazing on your coffee table.

★★★★★

MAREK KUKULA *is the Royal Observatory Greenwich's Public Astronomer*

write the book?

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Why is it important to 'colour the Universe'?

How do we make a colour image out of X-rays; a kind of high-energy light our eyes can't see? This is one of the many examples we talk about in the book, where we create an image that allows us to observe what's happening in otherwise invisible yet very real data. The book contains over 300 images and each has a story as to how it was created, what it shows and what scientists can learn from it. We hope the book will help people better understand these beautiful images.

TRAVIS RECTOR *is an astronomer at the University of Alaska Anchorage*